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Juxtaposition of in vivo vs. in vitro assessments of nanoparticles combined toxicity

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The overwhelming majority of the experimental studies in the field of metal nanotoxicology have been performed on cultures of established cell lines, with very few researchers focusing on animal experiments, while a juxtaposition of conclusions inferred from these two types of research is blatantly lacking. The least studied aspect of this problem relates to characterizing and predicting the combined toxicity of metallic nanoparticles,

Comparative and combined toxic effects of purposefully prepared spherical NiO and Mn_3O_4 nanoparticles (mean diameters 16.7±8.2 nm and 18.4±5.4 nm respectively) was estimated on cultures of human cell lines: MRC-5 fibroblasts, THP-1 monocytes, SY-SY5Y neuroblastoma cells, as well as on the latter two lines differentiated to macrophages and neurons, respectively. The combined cytotoxicity was mathematically modeled using the Response Surface Methodology.

The comparative assessment of the studied NPs unspecific toxicity obtained *in vivo* was satisfactotily reproduced by the *in vivo* tests. However, with respect to manganese-specific brain damage which had been demonstrated by us in animal experiment with the same NPs, the testing on on neuronall cell crlture showed only a certain enhancing effect of Mn_3O_4-NPs on the toxic action of NiO-NPs, while the role of the latter prevailed.

From the point of view of the preventive toxicology, the experimental modeling of metallic NPs combined toxicity on cell cultures may give non-reliable predictions of actual health risks.